

WE CLAIM:

1. A method for treating laundry, the method comprising steps of:
 - (a) applying a bleaching and antimicrobial composition to the laundry in a laundry washing machine at a first pH that favors bleaching properties and at a second pH that favors antimicrobial properties, wherein the first pH and the second pH are different; and
 - (b) draining the bleaching and antimicrobial composition from the laundry.
2. A method according to claim 1, wherein the treatment composition comprises a detergent composition for removal of soil from the laundry.
3. A method according to claim 1, further comprising:
 - (a) washing the laundry with a detergent use solution in a laundry washing machine prior to the step of applying a bleaching and antimicrobial composition to the laundry.
4. A method according to claim 3, further comprising:
 - (a) draining at least a portion of the detergent use solution from the laundry washing machine prior to the step of applying a bleaching and antimicrobial composition to the laundry.
5. A method according to claim 1, wherein the first pH is provided at between about 5 and about 11, and the second pH is provided at between about 2 and about 8.
6. A method according to claim 1, wherein the step of applying a bleaching and antimicrobial composition to the laundry in a laundry wash machine comprises bleaching at the first pH for between about 1 minute and about 20 minutes, and

providing antimicrobial properties at the second pH for between about 1 minute and about 20 minutes.

7. A method according to claim 1, wherein the step of applying a bleaching and antimicrobial composition to the laundry comprises adding a pH adjusting agent to decrease the pH from the first pH to the second pH.

8. A method according to claim 7, wherein the pH adjusting agent comprises at least one of sulfuric acid, nitric acid, hydrochloric acid, phosphoric acid, carboxylic acid, carbon dioxide, ozone, and mixtures thereof.

9. A method according to claim 1, wherein the step of applying a bleaching and antimicrobial composition to the laundry comprises adding a pH adjusting agent to increase the pH from the second pH to the first pH.

10. A method according to claim 9, wherein the pH adjusting agent comprises at least one of alkaline metal hydroxide, alkaline metal silicate, alkaline metal carbonate, alkaline metal bicarbonate, alkaline metal sesquicarbonate, and alkaline metal borate.

11. A method according to claim 1, wherein the bleaching and antimicrobial composition comprises a coated pH adjusting agent that introduces the pH adjusting agent once the coating has degraded.

12. A method according to claim 1, wherein the step of applying comprises adding a pH adjusting agent to change the pH between the first pH and the second pH.

13. A method according to claim 1, wherein the bleaching and antimicrobial composition comprises at least one of a halogen bleach and an oxygen bleach.

14. A method according to claim 13, wherein the halogen bleach comprises at least one of chlorine dioxide, potassium dichloroisocyanurate, sodium dichloroisocyanurate, chlorinated trisodiumphosphate, sodium hypochlorite, calcium hypochlorite, lithium hypochlorite, monochloramine, dichloroamine, [(monotrichloro)-tetra (monopotassium dichloro)]pentaisocyanurate, paratoluene sulfondichloro-amide, trichloromelamine, N-chlorammeline, N-chlorosuccinimide, N,N'-dichloroazodicarbonamide, N-chloro-acetyl-urea, N,N'-dichlorobiuret, chlorinated dicyandiamide, trichlorocyanuric acid, dichloroglycoluril, 1,3-dichloro-5,5-dimethyl hydantoin, 1-3-dichloro-5-ethyl-5-methyl hydantoin, 1-chloro-3-bromo-5-ethyl-5-methyl hydantoin, dichlorohydantoin, salts or hydrates thereof, and mixtures thereof.

15. A method according to claim 13, wherein the oxygen bleach comprises an inorganic active oxygen composition comprising at least one of hydrogen peroxide, hydrogen peroxide adduct, ozone, group IIIA active oxygen compound, group VIA active oxygen compound, group VA active oxygen compound, group VIIA active oxygen compound, and mixtures thereof.

16. A method according to claim 1, wherein the bleaching and antimicrobial composition comprises at least one of a peroxycarboxylic acid, an ester of peroxycarboxylic acid, an alkaline metal salt of a peroxycarboxylic acid, and adducts thereof.

17. A method according to claim 1, wherein the bleaching and antimicrobial composition comprises at least one of C₁-C₁₀ aliphatic peroxycarboxylic acid, salt of C₁-C₁₀ aliphatic peroxycarboxylic acid, ester of C₁-C₁₀ aliphatic peroxycarboxylic acid, and mixture thereof.

18. A method according to claim 1, wherein the bleaching and antimicrobial composition comprise peroxyoctanoic acid.

19. A method according to claim 1, wherein the bleaching and antimicrobial composition comprises an activator.

20. A method according to claim 1, wherein the bleaching and antimicrobial composition comprises at least one of souring agents, fabric softening agents, starch, sizing agents, color-fastness agents, oil and water repellant agents, water conditioning agents, iron controlling agents, water threshold agents, soil releasing agents, soil shielding agents, optical brightening agents, fragrances, and mixtures thereof.

21. A method according to claim 1, further comprising a step of rinsing the bleaching and antimicrobial composition from the laundry.

22. A method for treating laundry, the method comprising steps of:

- (a) applying a bleaching and antimicrobial composition to the laundry in a laundry washing machine at a first condition that favors bleaching properties and at a second condition that favors antimicrobial properties, wherein the first condition and the second condition are different; and
- (b) draining the bleaching and antimicrobial composition from the laundry.

23. A bleaching and antimicrobial composition comprising:

- (a) a bleaching/antimicrobial agent comprising at least one of a halogen bleach and an oxygen bleach; and
- (b) a coated pH adjusting agent for adjusting the pH of the bleaching and antimicrobial composition once the coating degrades.

24. A composition according to claim 23, wherein the pH adjusting agent comprises at least one of sulfuric acid, nitric acid, hydrochloric acid, phosphoric acid, carboxylic acid, carbon dioxide, ozone, and mixtures thereof.

25. A composition according to claim 23, wherein the pH adjusting agent comprises at least one of alkaline metal hydroxide, alkaline metal silicate, alkaline metal carbonate, alkaline metal bicarbonate, alkaline metal sesquicarbonate, and alkaline metal borate.

26. A composition according to claim 23, wherein the coating comprises a cellulose derivative.

27. A composition according to claim 23, wherein the bleaching/antimicrobial agent comprises at least one of chlorine dioxide, potassium dichloroisocyanurate, sodium dichloroisocyanurate, chlorinated trisodiumphosphate, sodium hypochlorite, calcium hypochlorite, lithium hypochlorite, monochloramine, dichloroamine, [(monotrichloro)-tetra (monopotassium dichloro)]pentaaisocyanurate, paratoluene sulfondichloro-amide, trichloromelamine, N-chlorammeline, N-chlorosuccinimide, N,N'-dichloroazodicarbonamide, N-chloro-acetyl-urea, N,N'-dichlorobiuret, chlorinated dicyandiamide, trichlorocyanuric acid, dichloroglycoluril, 1,3-dichloro-5,5-dimethyl hydantoin, 1-3-dichloro-5-ethyl-5-methyl hydantoin, 1-chloro-3-bromo-5-ethyl-5-methyl hydantoin, dichlorohydantoin, salts or hydrates thereof, and mixtures thereof.

28. A composition according to claim 23, wherein the bleaching/antimicrobial agent comprises at least one of hydrogen peroxide, hydrogen peroxide adduct, ozone, group IIIA active oxygen compound, group VIA active oxygen compound, group VA active oxygen compound, group VIIA active oxygen compound, and mixtures thereof.

29. A composition according to claim 23, wherein the bleaching/antimicrobial agent comprises at least one of a peroxycarboxylic acid, an ester of peroxycarboxylic acid, an alkaline metal salt of a peroxycarboxylic acid, and adducts thereof.

30. A composition according to claim 23, wherein the bleaching/antimicrobial agent comprises at least one of C₁-C₁₀ aliphatic peroxycarboxylic acid, salt of C₁-C₁₀ aliphatic peroxycarboxylic acid, ester of C₁-C₁₀ aliphatic peroxycarboxylic acid, and mixture thereof.

31. A composition according to claim 23, wherein the bleaching/antimicrobial agent comprises peroxyoctanoic acid.

32. A composition according to claim 23, further comprising an activator.

33. A laundry washing machine comprising:

- (a) a drum having an interior for holding laundry;
- (b) a motor constructed and arranged for rotating the drum;
- (c) a water inlet for introducing water into the drum interior;
- (d) a chemical inlet for introducing chemicals into the drum interior;
- (e) a drain for allowing fluid to drain from the drum interior; and
- (f) a processing unit constructed for operating the laundry washing machine to provide a washing cycle for washing laundry with a detergent use solution, a rinsing cycle for removal of at least a portion of the detergent use solution, and a treatment cycle for treating laundry with a bleaching and antimicrobial composition at a first pH that favors bleaching properties and at a second pH that favors antimicrobial properties.

34. A laundry wash machine according to claim 32, further comprising:

- (a) a second chemical inlet for introducing a pH adjusting agent into the drum interior.